The economic benefits of lifelong learning in terms of innovative model of economy: comparative analysis

ANNA LEVCHENKO [1] – HALYNA KUZMENKO [2] – OLHA HORPYNCHENKO[3]
Central Ukrainian National Technical University,
Ukraine

Abstract

The paper is devoted to the research of the economic benefits of lifelong learning in terms of innovative model of economy. The introduction outlines the importance of new knowledge and its rapid "aging", the role of lifelong learning in such conditions. The next stage was the research of scientific papers by the issue of lifelong learning, its benefits. The aim of the paper is to analyze the economic benefits of lifelong learning in terms of innovative model of economy and dependence of average wage from such factors as lifelong learning, higher education development, infrastructure and digital content and skills; relationship between these indicators. With regard to the aim, we have set the following hypothesis: we assume that there is a statistically significant correlation between total average wages, the Indicator of Lifelong learning, Higher Education development, Infrastructure and digital content and the Indicator of Skills. The analysis confirmed that the economic benefits, such as wage (personal) and gross domestic product (national general) have strong relationship with lifelong learning. Moreover, among the four factors of influencing on the average wages (the Indicator of Lifelong learning, Higher Education development, Infrastructure and digital content and the Indicator of Skills), the value of lifelong learning is rather significant, but less than infrastructure and digital content.

Key words: Lifelong Learning, Innovative Model of Economy, Competence of Employees, Wages, Adult Education, GDP

JEL Classification: A13; A23, E24

1 Introduction

The current stage of economic and social development is characterized by so high rates of scientific and technological progress, informatization, globalization and integration of economic processes. In such conditions, the requirements for the competence of employees are constantly increasing, and the prospects for their career growth, income growth, the ability for adaption to the changing environment are directly determined by the ability to master a new knowledge and skills, the willingness constantly of upgrading their skills or changing their profession. Now, as a result of scientific and technical progress over the course of a century, 6-9 generations of technology are being updated (and these rates are accelerating), and the "aging" of knowledge and skills are constantly taking place. Under such conditions, one can prepare for a lifetime of professional activity during one training cycle: according to

[1] Associate professor Anna Levchenko, Ph.D in Economics, Central Ukrainian National Technical University; Faculty of Economy and Management, Department of Economics, Management and Commercial Activity, prospect Universytetskyi, 8, 25006 Kropyvnytskyi, Ukraine, lao18057@gmail.com
[2] Associate professor Halyna Kuzmenko, Ph.D in Economics, Central Ukrainian National Technical University; Faculty of Economy and Management, Department of Audit and Taxation, prospect Universytetskyi, 8, 25006 Kropyvnytskyi, Ukraine, galina.leda @gmail.com
[3] Assistant professor Olha Horpynchenko, Central Ukrainian National Technical University; Faculty of Economy and Management, Department of Economics, Management and Commercial Activity, prospect Universytetskyi, 8, 25006 Kropyvnytskyi, Ukraine, 77ov77@ukr.net

the analysts' opinion, about 5% of theoretical and 20% of professional knowledge are updated annually. The unit of measurement of obsolescence of specialist knowledge, which was adopted in the USA - the half-life period of competence, that is 50% of decreasing in its competence due to the appearance of new information, shows that in many professions this period comes in less than 4-5 years. In this regard, lifelong learning is becoming more relevant day by day.

Firms can no longer rely solely on new graduates or new labor market entrants as the primary source of new skills and knowledge. Instead, they need workers who are willing and able to update their skills throughout their lifetimes. Countries need to respond to these needs by creating education and training systems that equip people with the appropriate skills (World Bank).

According to the Lisbon Strategy the eight key competences in the recommendation of the European Parliament and of the Council on key competences for lifelong learning are: communication in mother tongue; learning to learn; communication in foreign languages; social and civic competences; competences in maths, science, technology; sense of initiative and entrepreneurship; digital competences; cultural awareness and expression (Lisbon Strategy).

Some research (Cedefop, 2010) emphasizes the importance of lifelong learning as a way to sustain employment and personal development throughout life, not only during the career.

Economic factors such as income and employment play an important part in lifelong learning. They can provide people with reasons for joining learning programmes, as well as featuring in policy decisions on financing provision. The direct economic effects of lifelong learning potentially include impacts on earnings, on employability, and on the wider economy (Field, 2012).

Lifelong learning is becoming more and more important for the countries that want to be competitive in the global knowledge economy. So the era of the 21st century is not only a new landmark development but, above all, a transformational shift to the intellectualization as the process of the saturation of the information environment by the intellectual assets (Levchenko and al, 2017).

Analyzing the research Levchenko et al., 2017), we can observe a positive tendency of increasing the indicator of lifelong learning during the analyzed period. Under the influence of the 4th Industrial Revolution, the authors identified the interdependence between the global competitiveness index and lifelong learning, therefore, we are putting the next hypothesis about interrelation between the global innovation index, lifelong learning and the indicator of state cluster development in conditions of innovative-oriented economy.

Besides, the countries which pay more close attention and implement the effective models of lifelong learning have more intensive pace of innovation development of their economy. Furthermore, in such countries educational policy covers all types of education, learning and lifelong skills enhancement in the traditional education system, in adult and continuing education, in ongoing vocational training as part of working life, and in a variety of other contexts in which people learn and develop their knowledge, skills and competencies (Levchenko and Horpynchenko, 2017).

Lifelong learning has been linked to a variety of benefits, for the individual, the economy and wider society (Field, 2009). The researches show that participation in learning has a positive impact on life satisfaction (Feinstein et al., 2008a), optimism and subjective well-being (Moody, 2004; Hammond and Feinstein, 2006; Jenkins, 2009).

Adult learners also report increased confidence (Dench and Regan, 2000; Schuller et al., 2002, 2004; Preston and Hammond, 2003), mental stimulation (Feinstein et al., 2008b; Withnall, 2010) and an improved sense of self-efficacy (Hammond and Feinstein, 2006; Richeson et al., 2007; Formosa, 2013). Lifelong learning may also help people to develop the skills and knowledge to make informed choices about their lives, especially during periods of crisis and transition (Tuckett and McAuley, 2005).

Besides, the scientists defined, the lifelong learning has impact on men's wages (Dorsett, 2016). But as are known, the wage differentials - which provide an incentive to invest in skills - are widening in the knowledge economy. Narrowing the wage differentials among workers with different levels of education is expected to be very costly - perhaps as high as $1.66 trillion in the United States alone (Heckman, Roselius, and Smith 1994). Providing lifelong learning opportunities will require increased spending on education and training (by both the public and the private sector), but building in incentive schemes (capital accumulation) could reduce the investment needed (World Bank). It means that lifelong learning minimizes investment in self-development by optimizing them: the costs of self-education, different types of courses, training or workshop are lower than the costs of formal education (diplomas' degree).

Thus, the aim of our scientific research is analysis of economic benefits of lifelong learning in terms of innovative model of economy and dependence of average wage from such factors as lifelong learning, higher education development, infrastructure and digital content and skills; relationship between these indicators. For the solving of this aim we consider that it's necessary to analyze the next goals: analysis the Global Competitiveness Report, the Global Talent Competitiveness Index, the Global Information Technology Report and Indicator of earnings and wages (using OECD database). We put forward the following hypothesis that there is a statistically significant correlation between total average wages, the Indicator of Lifelong learning, Higher Education development, Infrastructure and digital content and the Indicator of Skills.

2 Methods

From standpoint of the methodology of our research in first phase of implementation, which are based on the research of foreign and Ukrainian literatures and the analysis of the results of one's own research. In our own research, we used the method of analysis and synthesis. The relationship between total average wages, the Indicator of Lifelong learning, Higher Education development, Infrastructure and digital content and the Indicator of Skills - representing the indicators were analyzed using Pearson correlation coefficient and linear regression. These indicators have been selected from OECD database for the year 2014, the Global Competitiveness Report 2016, the Global Talent Competitiveness Index, the Global Information Technology Report. The analysis has been carried out using Statistica Package.

3 Lifelong learning in innovative model of economy: benefits

To quantify the strength of the relationship between economic benefits (personal, in wage) and lifelong learning, we can conduct the correlation-regression analysis.

Table 1 The Pearson's correlation coefficients between the average total wages, the indicator of lifelong learning, higher education development, infrastructure and digital content and the indicator of skills

	Lifelong learning	HEd	Infrastructure and digital content	Skills
Average total wages	0,777418	0,600669	0,840623	0,739324

Source: Authors' own elaboration

As we can see from Table 1, the value of the pair correlation is more than 0.5, which is evidence of a linear correlation between variables, namely: the strongest relationship is observed between the total average wages and the infrastructure and digital content (0.841), total average wages and Lifelong learning[4] (r = 0.777); total average wages and Skills (r = 0.739); (r= 0.8158) and notable correlation between total average wages and HEd (r = 0.601). It should be noted that the correlation coefficient of the relationship between total average wages and HEd is lower than the correlation coefficient of the relationship between total average wages and Lifelong learning because of the process of complement and challenge to the traditional institutions, such as: private sector trainers, virtual universities, international providers, corporate universities, educational publishers, content brokers, and media companies.

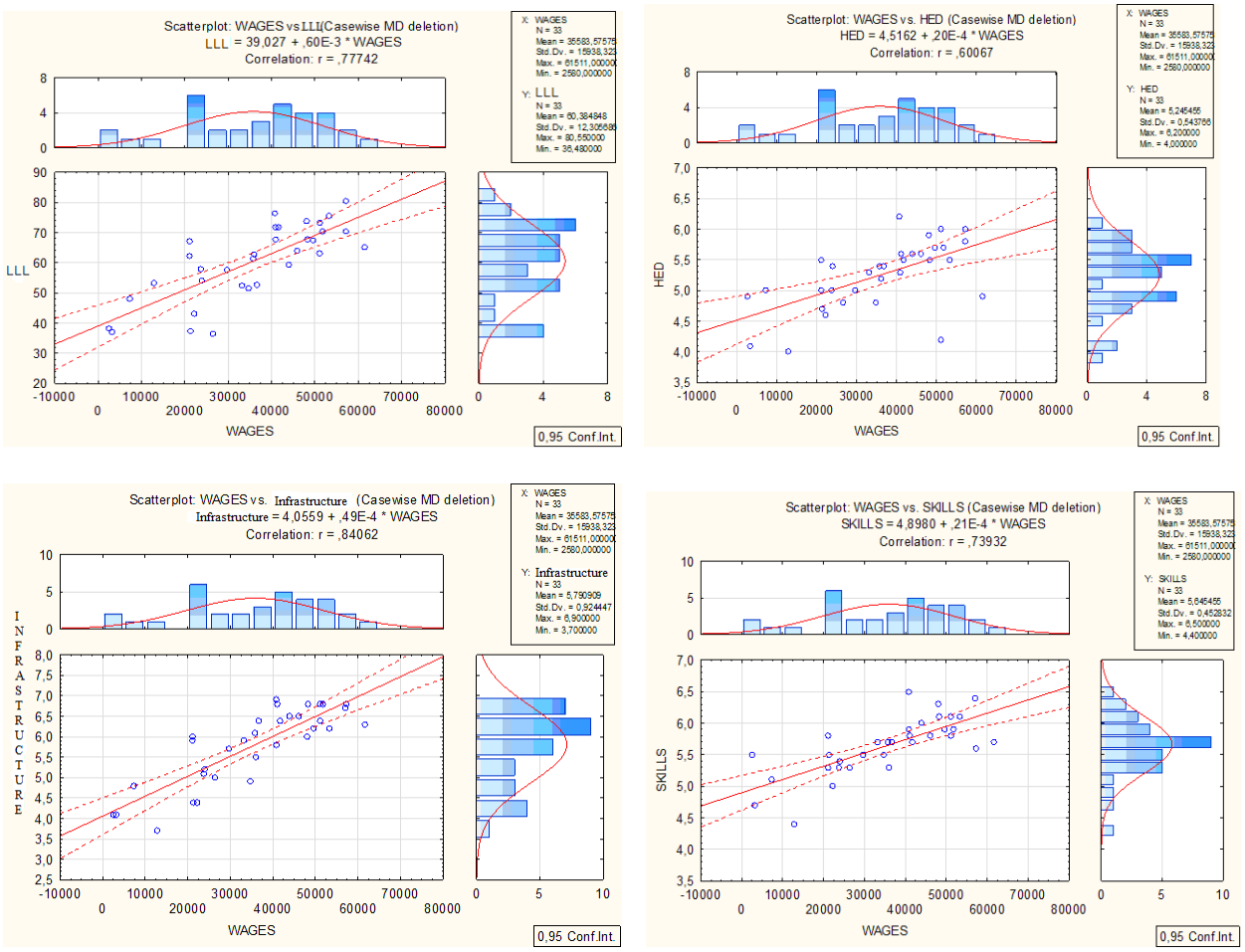

Figure 1 Linear regression model

Source: Authors' own elaboration [date of realese: The Global Talent Competitiveness Index 2014, The Global Competitiveness Report 2014, The Global Information Technology Report 2014, Worldbank 2016]

[4] Note: LLL- Lifelong learning, Skills- Readiness subindex (Skills), HEd - Global innovation index (subindex high education), Infrastructure - Readiness subindex (Infrastructure and digital content)

Taking into account the strength of correlation between the analyzed variables, the following conclusions can be made. First of all, the authors' hypothesis that strong positive correlations exist between total average wages and indicator of Lifelong learning can be accepted.

As we can observe the stated below scatter plots from the Figure 1, the relationship between all variables is linear, there is normal distribution.

So, from the Figure 1, we can see, that mean value of Lifelong learning is 60,30. The lowest value of Lifelong learning among the countries is 36,40 score (minimum), the highest is 80,55 score (maximum). The highest value is on 54,15 score higher than the lowest value (dimension). The standard deviation is 12,30 (12,30*2=24,6). Consequently, the variance, the square of the standard deviation, is (10.01) * 2 = 20.02. The asymmetry and the coefficient of variation are given with the corresponding standard errors.

The mean value of Readiness subindex (Skills) is 5,65. The lowest value of Readiness subindex (Skills) among the countries is 4,40 score (minimum), the highest is 6,50 score (maximum). The highest value is on 2,10 score higher than the lowest value (dimension). The standard deviation is 0,45.

The mean value of Global innovation index (subindex high education) is 5,25. The lowest value of Global innovation index (subindex high education) among the countries is 4,00 score (minimum), the highest is 6,20 score (maximum). The highest value is on 2,20 score higher than the lowest value (dimension). The standard deviation is 0,54.

And the mean value of Infrastructure - Readiness subindex (Infrastructure and digital content) is 5,79. The lowest value of Infrastructure - Readiness subindex (Infrastructure and digital content) among the countries is 3,70 score (minimum), the highest is 6,90 score (maximum). The highest value is on 3,20 score higher than the lowest value (dimension). The standard deviation is 0,92.

The Regression analysis was conducted with using the programme Statistica 12.0, the achieved results are shown in Table 2.

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Multiple Regression Results

  Dependent: WAGES            Multiple R =  ,87089418     F = 21,98031
                                    R?=  ,75845668    df =   4,28
  No. of cases: 33            adjusted R?=  ,72395049     p =  ,000000
               Standard error of estimate:8374,0613079
  Intercept: -60799,90700  Std.Error: 21216,69  t(   28) = -2,866  p =
,0078

            LLL b*=,320             HED b*=-,26      INFRASTRUCTURE
b*=,536
          SKILLS b*=,294

  (significant b* are highlighted in red)
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Table 2 Regression Summary for Dependent Variable: WAGES

R= ,87089418 R?= ,75845668 Adjusted R?= ,72395049 F(4,28)=21,980 p<,00000 Std.Error of estimate: 8374,1						
N=33	**b***	**Std.Err. of b***	**b**	**Std.Err. of b**	**t(28)**	**p-value**
Intercept			-60799,9	21216,69	-2,86566	0,007810
Lifelong learning	0,320314	0,170663	414,9	221,04	1,87688	0,070991
HEd	-0,263591	0,172443	-7726,1	5054,49	-1,52856	0,137592
Infrastructure and digital content	0,536240	0,188698	9245,3	3253,32	2,84180	0,008276
Skills	0,293503	0,189678	10330,4	6676,08	1,54738	0,133002

Source: Authors' own elaboration

Statistical significance of the model, verified with the help of the Fisher criterion (F): F (4,28) = 21,980 p <, 000001. Since p <000001, the null hypothesis that there is no relationship between the variables can be overridden, that is, the presence of a connection between the variables studied is statistically confirmed.
The coefficient of determination of the model R2 =, 758.
The values of the constant (b0) and the regression coefficient (b1) of the linear regression equation y = b1 * x + b2 * x + b3 * x + b4 * x + b0: b0 = -60799.9, b1 = 414.9, b2 = -7726.1, b3 = 9245.3, b4 = 10330.4.

The program also tests the null hypothesis about the zero value of the coefficient and constant using the Student's coefficient. In this case, the values of the Student's coefficient allow rejecting the null hypothesis both with respect to the constant and Regression coefficient for Infrastructure and digital content (p-value = 0.008276), for other coefficients - on the contrary, since the p-value value is above 0, 05.

Thus, among the four factors of influencing on the average wages (the Indicator of Lifelong learning[5], Higher Education development, Infrastructure and digital content and the Indicator of Skills), the value of lifelong learning is rather significant, but less than infrastructure and digital content. It could be explained through the process of comprehensive digitization of the all sphere of innovative economy and the inability to be engaged in lifelong learning without infrastructure and digital content.

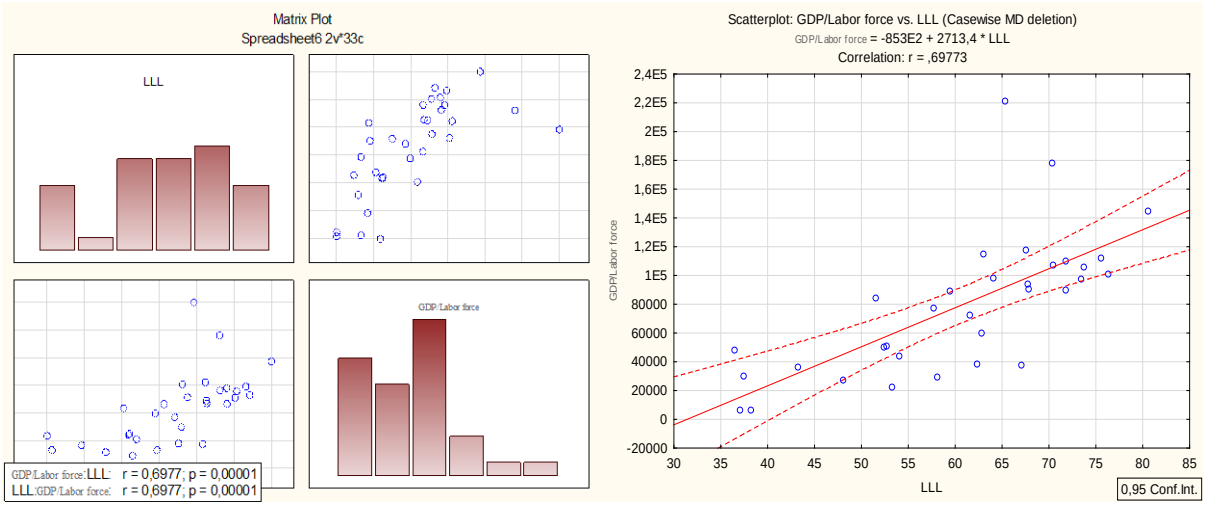

Figure 2 Linear regression model
Source: Authors' own elaboration [date of realese: Worldbank 2016, The Global Talent Competitiveness Index 2014]

[5] Note: LLL- Lifelong learning, GDP/Labor force - Gross domestic product / Labor force (ages 15 and older)

As we can see from Figure 2, the value of the pair correlation is more than 0.5, which is evidence of a linear correlation between variables, namely: the notable relationship is observed between the GDP/Labor force and the State of Lifelong learning (0.697), that is, in terms of innovative model of economy the state of development of lifelong learning influences on the level of GDP/labor force. It explains the fact that the developed countries are increasingly focusing on the development of lifelong learning through the dissemination and implementation the lifelong learning's policy.

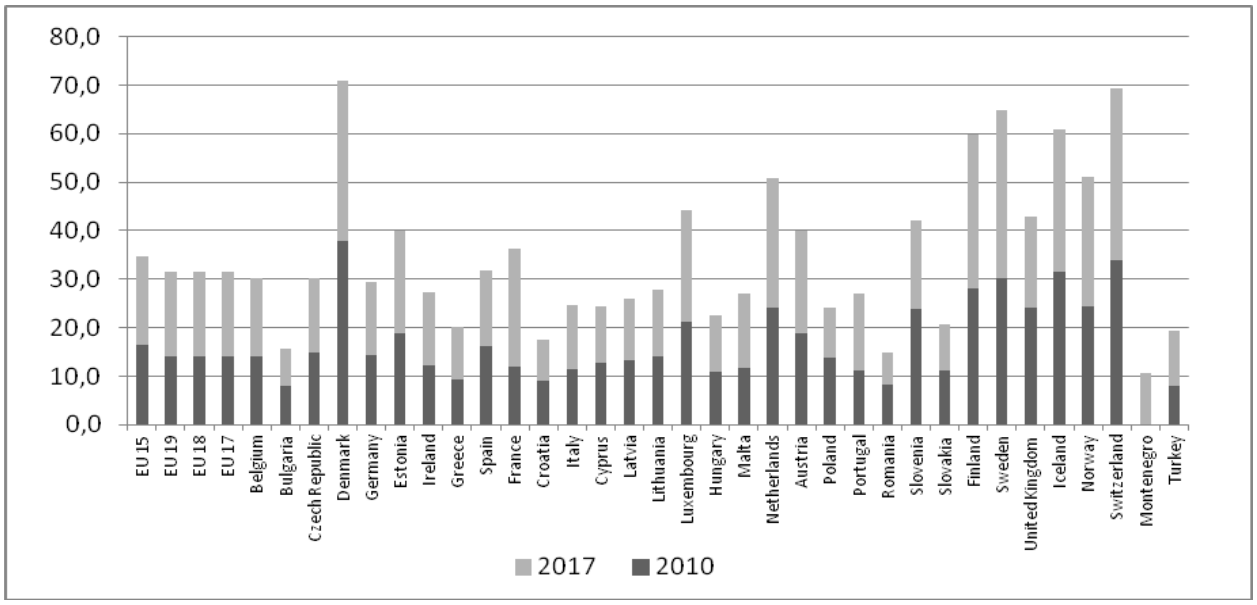

Figure 3 Adult participation in lifelong learning (% of population aged 25 to 64)
Source: Authors' own elaboration

As an example, Figure 3 shows the dynamics of adult participation in lifelong learning in the last 7 years in the EU's country. Most countries have increased their coverage of lifelong learning over the past few years: from 5% to 18.7 % (France), from 5.5 % to 9.8 % (Portugal), from 9.3% to 10.9 % (the EU-28 in whole) etc.

Unfortunately, we should note, that in "transition economies" lifelong learning is less popular. Most countries are only beginning to develop the mechanism of its provision and conditions for its development. In such countries is observed the adherence to the traditional education (the coverage of the population by higher education is the highest in the world). But as the above obtained results show, the HEd is less significant indicator in forming the average wages.

Conclusion

Thus, summarizing the above, we have to conclude about the following: the development of lifelong learning's policy is so important in terms of innovative model of economy, first of all, for "transition economies" because they will allow the growth in labor productivity due to the increasing of the average wages for individual and value of GDP per labor force for country in whole. The correlation-regression analysis showed strong positive correlations between total average wages and indicator of Lifelong learning, besides - a notable relationship between the GDP/Labor force and the State of Lifelong learning, which indicate on the impact of the state of development of lifelong learning influences on the level of GDP/labor force. Besides, we can admit, that there are positive correlations between Higher Education development, Infrastructure and digital content and the Indicator of Skills, in comparing with

Lifelong Learning. The process of developing a lifelong learning policy involves the permanent training and re-training of labor by upgrading and adapting the skills to the changes in global economy under conditions of innovative model, by taking account the aspects of rapid technological changes and increasing the share of the importance of knowledge (a new knowledge) in the production process. The concrete measures to support lifelong learning should include: better cooperation between universities and business sector, better adaptation of training and retraining to the existing labor market demand, improvement of educational programs and development of information services, consultancy, mediation and training in the National Employment Agency under the concept of lifelong training, organization of the training courses, involving the European funding for the development of training programs, conducting the training programs for employees, increasing cooperation between schools and universities, carrying out the training programs for employees, increasing access to education by increasing the number of colleges and universities due to the funded places, increasing the financial support for lifelong education programs etc. By implementing the lifelong learning's measures countries can recover the gaps in compared to the developed countries, and, as result, to improve work efficiency of labor force due to the personal economic effects for them and country in general.

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